netsys

Networking your world

NVF-200LS/Rver.S

4 Band VDSL CO/CPE Modem with Dip Switch

USER'S MANUAL

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Maximum signal rate derived form IEEE Standard specifications. Actual data throughput will vary. Network conditions and environmental factors, including volume of network traffic, building materials and construction, and network overhead lower actual data throughput rate.

VDSL Point to Point Solution

The NVF-200LS/Rver.S works as Ethernet to/from VDSL subscriber-site conversion bridge. The NVF-200LS/Rver.S uses QAM-based 4-band VDSL technology which supports max distance 1.9km (6333 ft.) at 5M/5M or 1.3km (4333 ft.) at 15M/15M, or 800m (2666 ft.) at 25M/25M symmetrical data service. The NVF-200Rver.S also works with NVF-800S/NVF-2400S VDSL IP DSLAM, together to form a cost-effective solution for services such as remote lecturing, telemedicine, video conferencing, Video-on-Demand (VOD), IP-TV, Internet access, and various high-speed data applications.

The front-panel provides LED indicators of system and interface status. The built-in POTS/ISDN splitter allows a standard POTS phone or ISDN device to be connected. Full or half-duplex mode of LAN operations is automatically sensed and configured. VDSL link rates are configured by local modem or IP DSLAM over auto speed or fix speed function.

Therefore, NVF-200LS/Rver.S supports plug & play operations on the subscriber-site and can do auto and manual selection of the data speed. An ideal solution for delivering cost-effective, high-performance broadband/multimedia services to Multi-Dwelling Units (MDU) and Multi-Tenant Units (MTU) such as hotels, campuses and hospitals environments.

Safety Warnings

For your own safety, make sure to read and follow all warning notices and instructions before using the device.

- DO NOT open the unit or device. Opening or removing the covers can expose you to dangerous high voltage points or other risks. ONLY qualified service personnel can service the device. Please contact your vendor for further information.
- Use ONLY the dedicated power supply for your device. Connect the power cord or power adapter to the right supply voltage (e.g. 110V AC in North America or 230V AC in Europe).
- DO NOT use the device if the power supply is damaged as it might cause electrocution. If the power supply is damaged, remove it from the power outlet. DO NOT attempt to repair the power supply. Contact your local vendor to order a new power supply.
- Place connecting cables carefully so that no one will step on them or stumble over them. DO NOT allow anything to rest on the power cord and do NOT locate the product where anyone can work on the power cord.
- DO NOT install nor use your device during a thunderstorm. There may be a remote risk of electric shock from lightning.
- DO NOT expose your device to dampness, dust or corrosive liquids.
- DO NOT use this product near water (e.g. in a wet basement or near a swimming pool).
- Connect ONLY suitable accessories to the device. Make sure to connect the cables to the correct ports.
- DO NOT obstruct the device ventilation slots, as insufficient airflow may harm your device.
- DO NOT store things in the device.
- DO NOT use the device outside, and make sure all the connections are indoors. There may be a remote risk of electric shock from lightning.
- Be careful when unplugging the power due to transformer may be very hot.
- Keep the device and all its parts and accessories out of children's reach.
- Clean the device using a soft and dry cloth rather than liquid or atomizers. Power off the equipment before cleaning it.
- This product is recyclable. Dispose of it properly.

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1. Unpacking Information

Check List

Carefully unpack the package and check its contents against the checklist.
Package Contents

- VDSL 4-Band Modem (NVF-200LS for CO side / NVF-200Rver.S for CPE side)
- AC To DC Power Adapter
- Four rubber feet
- User Manual
- RJ-45 cable
- RJ-11 cable

Please inform your dealer immediately for any missing or damaged parts.
If possible, retain the carton including the original packing materials.
Use them to repack the unit in case there is a need to return for repair.

2. Installing the Modem

Hardware Installation

This chapter describes how to install the modem and establishes network connections and may install the modem on any level surface (e.g. a table or shelf). However, please take note of the following minimum site requirements before one begin. Stick the 4 rubber feet at the bottom to avoid scratches.

Pre-installation Requirements

Before you start the actual hardware installation, make sure you can provide the right operating environment, including power requirements, sufficient physical space, and proximity to other network devices that are to be connected.

Verify the following installation requirements:

- Power requirements: DC 5V/1A or above
- The modem should be located in a cool dry place, with at least 10cm/4in of space at the front and back for ventilation.
- Place the modem out of direct sunlight, and away from heat source or area with a high amount of electromagnetic interference.
- Check if the network cables and connectors needed for installation are available.

General Rules

Before making any connections to the modem, please note the following rules:

- Ethernet Port (RJ-45)
  All network connections to the modem Ethernet port must be made using Category 5 UTP for 100Mbps, Category 3, 4 UTP for 10Mbps.
  No more than 100 meters of cabling may be use between the MUX or HUB and an end node.
- VDSL Port (RJ-11)
  All Home network connections to the RJ-11port must use 24~26 gauge phone wiring.
- We do not recommend using 28 gauge or above phone line.

Connecting the Modem

The modem has one Ethernet port which support connection to Ethernet operation. The devices attached to these ports must support auto-negotiation or 10Base-T OR 100Base-TX unless they will always operate at half duplex. Use any of the Ethernet ports to connect to devices such as NIC, Switch, bridge or router.

The RJ-11 line port is used to connect to the RJ-11 modular socket (wall outlet) that is connected to the VDSL 4-Band CPE modem side (Point to point solution).

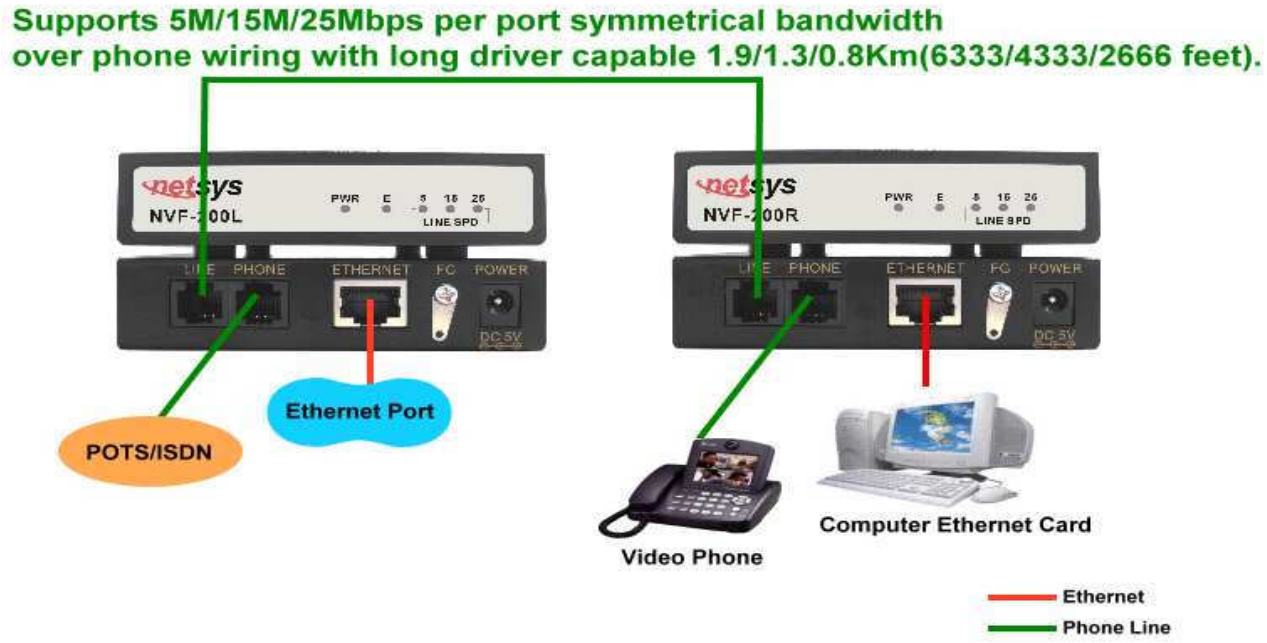
The RJ-11 phone port of the modem can be connected to a telephone for making calls

.

Connecting the RJ-11 / RJ-45 Ports

1. The modem's RJ-11 ports supports max distance 1.9km at 5M/5M or max speed 25M/25M symmetrical and distances up to 800m data service across existing phone wiring, without interfering with standard voice transmissions, easy-to-use which do not require installation of additional wiring. Every RJ-11 modular phone jack in the home can become a port on the LAN. Networking devices can be installed on a single telephone wire that can span within 1.9km or 800m (depends on speed) between the two farthest points. **(Figure 1)**.

Figure 1 VDSL Point-to-Point application



2. NVF-200LS/R modem has an embedded splitter between every VDSL side (Line) and POTS (Phone) side. It permits one to deliver broadband service on the same lines as Plain Old Telephone Service (POTS), PBX, ISDN traffic and VDSL Signal.

3. The RJ-11 port support max distance 1.9km at 5M/5M or max speed 25M/25M symmetrical and distances up to 800m data service. When inserting a RJ-11 plug, make sure the tab on the plug clicks into position to ensure that it is properly seated.

4. Do not plug a RJ-11 phone jack connector into the Ethernet port (RJ-45 port). This may damage the modem. Instead, use only twisted-pair cables with RJ-45 connectors that conform to Ethernet standard.

Notes:

1. Be sure each twisted-pair cable (RJ-45) does not exceed 100 meters (333 feet).
2. RJ-11 port use 24 ~ 26 gauge phone wiring, we do not recommend 28 gauge or above.
3. We advise using Category 3, 4, 5 cables for Cable modem or Router connections to avoid any confusion or inconvenience in the future when you attached to high bandwidth devices.
4. Be sure phone cable has been installed before NVF-200LS and NVF-200Rver.S power on.

3. Hardware Description

This section describes the important parts of the modem. It features the front panel, side panel and rear connectors.

Front Panel

The figure shows the front panel. **(Figure 2)**

Figure 2 Front Panel

At a quick glance of the front panel, it is easy to tell if the CO modem has power, if it has signal from its Ethernet RJ-45 port and if there is phone line signal on RJ-11 port.

Front Indicators

The modem has Five LED indicators. The following Table shows the description. **(Table 1)**

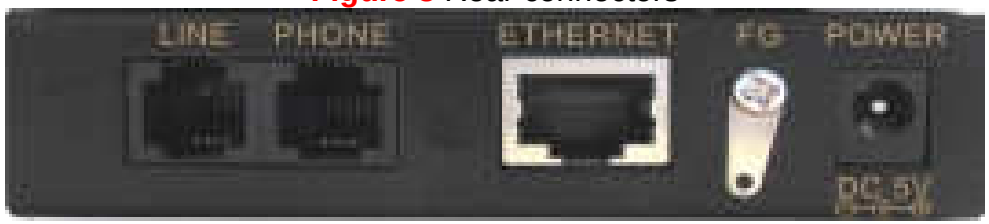
Table 1 LED Indicators Description and Operation

LED	Color	Status	Descriptions
PWR (Power LED)	Green	On	The device is receiving the power and functioning properly.
		Off	The device is not ready or has malfunctioned.
E (Ethernet LED)	Green	On	The device has a good Ethernet connection.
		Blinking	The device is sending or receiving data.
		Off	The LAN is not connected.
5 (VDSL LED)	Green	On	VDSL is in good linkage at 5Mbps data rate.
		Off	The VDSL connection is down.
15 (VDSL LED)	Green	On	VDSL is in good linkage at 15Mbps data rate.
		Off	The VDSL connection is down.
25 (VDSL LED)	Green	On	VDSL is in good linkage at 25Mbps data rate.
		Off	The VDSL connection is down.

Rear Panel

The following figure shows the rear connectors. **(Figure 3)**

Figure 3 Rear connectors



And the table shows the description. **(Table 2)**

Table 2 Description of the modem rear connectors

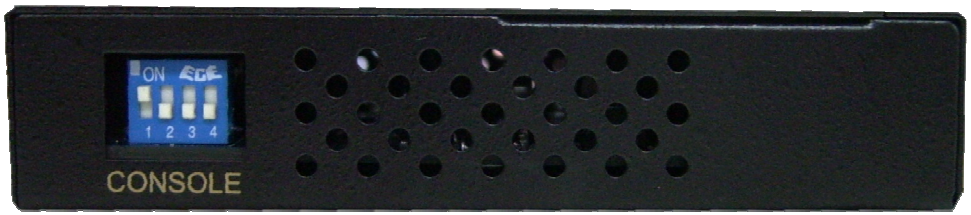
Connectors	**Type**	**Description**
Line	RJ-11	For connecting to the VDSL modem.
Phone	RJ-11	For connecting to the telephone or Fax, ISDN modem*
Ethernet	RJ-45	For connecting to a Ethernet equipped device

Note: If it is needed to connect to the ISDN modem, please refer to Appendix C for further details.

Side Panel

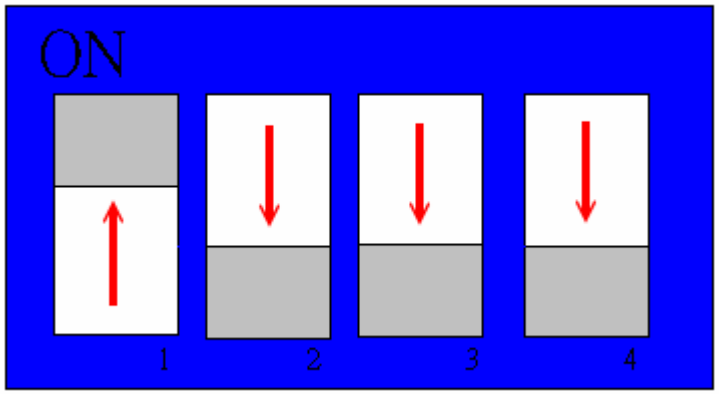
The following figure shows the DIP switch connection. **(Figure 4)**

Figure 4 Side panel



At quick glance, it is easy to see that the DIP switch pin 1 is switch ON where it is in auto-speed and that is also the default mode.

Figure 5 DIP switch setting



To set the data speed to 25Mbps simply switch ON the pin 2 while the other pins are switch OFF. To change it to 15Mbps, switch ON the pin 3 while the other pins are switch OFF, for 5Mbps switch on the pin 4 while other are switch OFF. Remember that no two pins can be activated at the same time or it will result in error and for data speed of 5Mbps. Table shows the summary of DIP switch configuration.

Table 3 DIP Switch Configuration

Speed mode	Pin 1	Pin 2	Pin 3	Pin 4
Auto speed	On	Off	Off	Off
25Mbps	Off	On	Off	Off
15Mbps	Off	Off	On	Off
5Mbps	Off	Off	Off	On

4. Firmware Description

Auto and manual data speed selector description:

NVF-200LS/R is a 4band VDSL solution which supports real plug & play and can do auto and manual selection of the data speed, the setting of the data speed depends on the phone cable length limit, they can support 5M/15M/25M symmetrical data service but depends on installation environment. If NVF-200LS try to link at 25Mbps data speed but fails to do so then NVL-200LS data speed must be lower due to the limitation of the phone cable length. If the cable length is unsure, then auto selection of the data speed at the default setting is recommended. Power must be unplug before changing of data speed then powered on and wait for VDSL to link again at the correct data speed function.

Speed mode limitation:

5M/5M mode within 1.9km (6333 ft.)
15M/15M mode within 1.3km (4333 ft.)
25M/25M mode within 800m (2666 ft.)
With the above phone cable limit based on without PBX noise.

Note:

We recommend phone cable that must meet Cat 3 standard or above and without clustering, otherwise the above guarantee will be void.

Appendix A: Cable Requirements

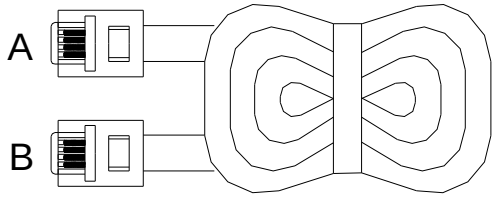
A CAT 3, 4 or 5 UTP (Unshielded Twisted Pair) cable is typically used to connect the Ethernet device to the modem. A 10Base-T cable often consists of four pairs of wires, two of which are used for transmission. The connector at the end of the 10Base-T cable is referred to as RJ-45 connector and it consists of eight pins. The Ethernet standard uses pins 1, 2, 3 and 6 for data transmission purposes. **(Table 4)**

Table 4 RJ-45 Ethernet Connector Pin out Assignments

PIN	MNEMONIC	FUNCTION
1	TX+	Ethernet differential Transmit signal (+)
2	TX-	Ethernet differential Transmit signal (-)
3	RX+	Ethernet differential receive signal (+)
4	NC	Unused
5	NC	Unused
6	RX-	Ethernet differential receive signal (-)
7	NC	Unused
8	NC	Unused

Standard telephone wire of any gauge or flat type, twisted or quad is used to connect the modem to the telephone network. A telephone cable typically consists of three pairs of wires, one of which is used for transmission. The connector at the end of the telephone cable is called RJ-11 connector and it consists of six pins. POTS (plain old telephone services) use pins 3 and 4 for voice transmission. A telephone cable is shown below. **(Figure 6)**

Figure 6 Telephone cable



The A and B connectors on the rear of the modem are RJ-11 connectors. These connectors are wired identically. The RJ-11 connectors have six positions, two of which are wired. The modem uses the center two pins. The pin out assignment for these connectors is presented below. **(Table 5)**

Table 5 RJ-11 Pin out Assignments

Pin#	**MNEMONIC**	**FUNCTION**
1	NC	Unused
2	NC	Unused
3	TIP	POTS
4	RING	POTS
5	NC	Unused
6	NC	Unused_

Appendix B: Product Specification

Key Features & Benefits

- Supports Universal Plug & Play
- Compliant with IEEE802.3 10BASE-T, IEEE802.3u and 100BASE-TX standard
- Compliant with ETSI, ITU & ANSI standards
- Max speed at 5M/5M with distance up to 1.9km(6333ft), Max speed at 15M/15M with distance up to 1.3km(4333ft), Max speed at 25M/25M with distance up to 800m(2666ft)
- Supports 1 * RJ-11 connector for Ethernet over VDSL
- Supports 1 * RJ-11 connector for telephone/PBX connection
- Supports 1 * RJ-45 port for 10/100Mbps Ethernet with Auto MDI/MDIX
- Supports 1* Dip switch(NVF-200LS only) for speed mode selection
- Supports Auto/5/15/25Mbps speed mode and full duplex for VDSL port
- Supports long packet size up to 1536 bytes
- Supports POTS/ISDN voice pass
- Supports PBO(Power Back Off) function for NVF-200R
- Supports 4wires phone set pass through
- Voice and Data work on the same telephone line
- Spectral compatibility with xDSL, ISDN (2B1Q/4B3T)
- Supports flow control IEEE802.3x for Full Duplex & Back Pressure for Half Duplex
- Supports Surge protection
- Provides Power LED and LED indication Link/Active Status for Ethernet port and Link/Speed for VDSL port
- Mini size and metal case for outdoor application

Product Specification

Standard:	IEEE802.3 standard IEEE802.3u standard Compliant with ETSI, ITU & ANSI standards
Interface:	1 * RJ-45 10/100Mbps Ethernet port 1 * RJ-11 connector for EoVDSL 1 * RJ-11 connector for telephone connection
Cable Connections:	RJ-45 (Ethernet): Category 3, 4, 5 UTP/STP RJ-11 (EoVDSL): Twisted Pair phone wire
LED indication:	Power Link/Active Status for Ethernet port Link/Speed for VDSL port
VDSL Frequency Spectrum:	NVF-200LS Transmitter: 900 kHz ~ 3.9MHz Receiver: 4MHz & 7.9MHz NVF-200Rver.S Transmitter: 4MHz ~ 7.9MHz Receiver: 900 kHz ~ 3.9MHz
POTS/ISDN pass filter Spectrum:	0 ~ 630kHz

Power Consumption:	NVF-200LS (LT): 2.15W NVF-200Rver.S (NT): 2.75W
Operating Temperature:	-20℃ ~ 70℃ (-4℉ ~ 158℉)
Storage Temperature:	-20℃ ~ 70℃ (-4℉ ~158℉)
Humidity:	10% to 90% (non-condensing)
Weight:	0.68kg
Dimensions:	95 x 110 x 24 mm (3.74" x 4.33" x 0.94”)

Appendix C: 4 Band VDSL Electrical Characteristics

Parameter		Min.	Typ.	Max.	Unit
Spectrum	Transmit	0.9		3.9	MHz
	Receive	4		7.9	MHz
PSD Level	Transmit	-70		-61.5	dBm/Hz
	Receive	-70		-60	dBm/Hz
Noise Margin			6		dB
5Mbps Link Margin	Transmit	27	31	35	dB
	Receive	27	31	35	dB
15Mbps Link Margin	Transmit	36	38	40	dB
	Receive	36	38	40	dB
25Mbps Link Margin	Transmit	41	43	45	dB
	Receive	41	43	45	dB

Appendix D: Troubleshooting

Diagnosing the Modem's Indicators

The modem can be easily monitored through its comprehensive panel indicators. These indicators assist the network manager in identifying problems the hub may encounter. This section describes common problems you may encounter and possible solutions.

1. **Symptom:** POWER indicator does not light up (green) after power on.
   Cause: Defective External power supply
   Solution: Check the power plug by plugging in another that is functioning properly. Check the power cord with another device. If these measures fail to resolve the problem, have the unit power supply replaced by a qualified distributor.
   Note: Don't use other AC to DC power adapter

2. **Symptom:** Link indicator does not light up (green) after making a connection.
   Cause: Network interface (ex. a network adapter card on the attached device), network cable, or switch port is defective.
   Solution: 2.1 Power off and re-power on the VDSL modem.
   2.2 Verify that the switch and attached device are power on.
   2.3 Be sure the cable is plugged into both the switch and corresponding device.
   2.4 Verify that the proper cable type is used and its length does not exceed specified limits.
   2.5 Check the modem on the attached device and cable connections for possible defects.

2.6 Make sure that the phone wire must be connected between NVF-200LS and NVF-200Rver.S first, when both are to be power on.

2.7 Replace the defective modem or cable if necessary.

3. Symptom: VDSL Link cannot be established.

Cause: VDSL speed mode setting failure or phone cable length is over the specification limit of the speed mode.

Solution:

3.1 Please make sure that the phone wire must be connected between NVF-200LS and NVF-200Rver.S when both are power on. NVF-200LS will do link speed function depending on speed mode setting and phone wire length, therefore if NVF-200LS can't detect NVF-200Rver.S over phone wire while both power on, this will cause the link to fail.

3.2 Please check phone cable must be 24 gauge with twisted pair and without rust, and the length is not over 1.9km.

3.3 Please check the correct Dip Switch setting.

Note: Phone cable must meet CAT 3 standard or above and without clustering, otherwise will cause more cross talk issue to reduce DSL power driver.

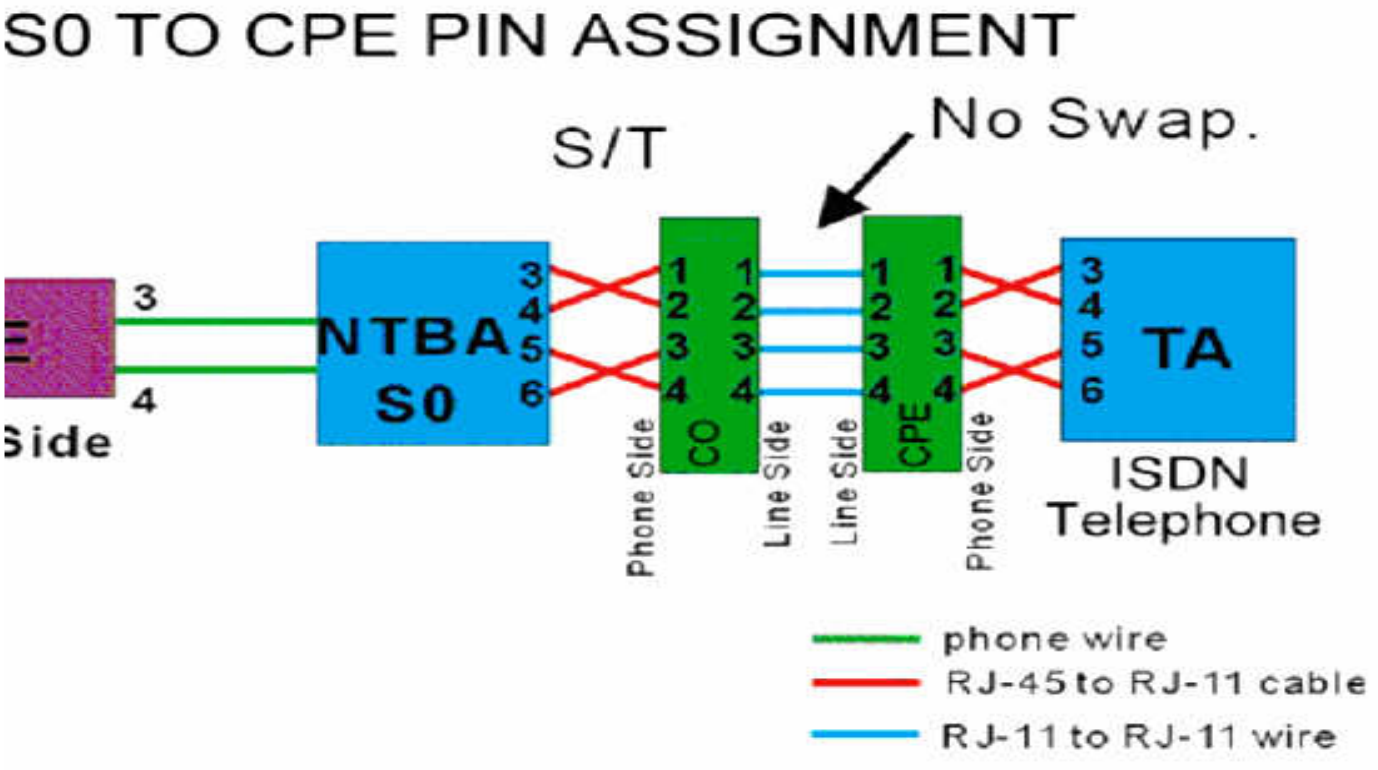
4. Symptom: VDSL speed mode LED is always flashing

Cause: VDSL speed mode link is at the limit of phone cable length

Solution: Please change speed mode through Dip switch.

Note: Don't use phone cable that is without twisted pair and under 0.4mm (26 Gauge) diameter.

5. **Symptom:** We tested with a regular S0 bus from an NTBA - data works, but ISDN telephone does not.
   Solution: You must connect according to the following chart if you want to connect CO and CPE with NTBA.



6. **Symptom:** VDSL line is at link margin.
   Cause: When the VDSL line is linking between 2 speeds at 5/15Mbps or 15/25Mbps.
   Solution: Fixed the speed to 5Mbps when it is linking between 5/15Mbps or fixed the speed to 15Mbps when it is linking between 15/25Mbps.

7. **Symptom:** VDSL flickers at 25Mbps when multicast streams.
   Cause: Power level is too high and noise immunity is weak.
   Solution: Fixed the speed to 15Mbps, since 15Mbps is ideal for multicast streaming while 25Mbps is for transferring large data file at high speed.

System Diagnostics

Power and Cooling Problems

If the POWER indicator does not turn on when the power cord is plugged in, you may have a problem with the power outlet, power cord, or internal power supply as explained in the previous section. However, if the unit power is off after running for a while, check for loose power connections, power losses or surges at the power outlet, and verify that the fan on back of the unit is unobstructed and running prior to shutdown. If you still cannot isolate the problem, then the internal power supply may be defective. In this case, please contact your local dealer.

Installation

Verify that all system components have been properly installed. If one or more components appear to be malfunctioning (e.g. the power cord or network cabling), test them in an alternate environment where you are sure that all the other components are functioning properly.

Transmission Mode

The default method of selecting the transmission mode for RJ-45 ports is 10/100 Mbps ETHERNET, for RJ-11 port are 5/15/25Mbps VDSL. Therefore, if the Link signal is disrupted (e.g. by unplugging the network cable and plugging it back in again, or by resetting the power), the port will try to reestablish communications with the attached device via auto-negotiation. If auto-negotiation fails, then communications are set to half duplex by default. Based on this type of industry-standard connection policy, if you are using a full-duplex device that does not support auto-negotiation, communications can be easily lost (i.e. reset to the wrong mode) whenever the attached device is reset or experiences a power fluctuation. The best way to resolve this problem is to upgrade these devices to a version that support Ethernet and VDSL.

Physical Configuration

If problems occur after altering the network configuration, restore the original connections, and try to track the problem down by implementing the new changes, one step at a time. Ensure that cable distances and other physical aspects of the installation do not exceed recommendations.

System Integrity

As a last resort verify the switch integrity with a power-on reset. Turn the power to the switch off and then on several times. If the problem still persists and you have completed all the preceding diagnoses, then contact your dealer.

Appendix E: Compliance and Safety Information

FCC Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a computing device, pursuant to Part 15 of FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

1. Reorient or relocate the receiving antenna.
2. Increase the separation between the equipment and receiver.
3. The equipment and the receiver should be connected to outlets on separate circuits.
4. Consult the dealer or an experienced radio/television technician for help.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

If this telephone equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations or procedures that could affect the proper functioning of your equipment. If they do, you will be notified in advance in order for you to make necessary modifications to maintain uninterrupted service.

This equipment may not be used on coin service provided by the telephone company. Connection to party lines is subject to state tariffs.

Important Safety Instructions

Caution: The direct plug-in wall transformer serves as the main disconnect for the product. The socket outlet shall be installed near the product and be readily accessible.

Use only the power supply included with this product. In the event the power supply is lost or damaged: In the United States, use only with CSA certified or UL listed Class 2 power supply, rated 5Vdc 1A or above. In Europe, use only with CE certified power supply, rated 5Vdc 1A or above.

Do not use this equipment near water, for example in a wet basement. Avoid using a telephone during an electrical storm. There may be a remote risk of electrical shock from lightning.

Do not use the telephone to report a gas leak in the vicinity of the leak.

If trouble is experienced with this unit, please contact customer service at the address and phone listed below. Do not disassemble this equipment. It does not contain any user serviceable components.

FCC Warning

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

CE Mark Warning

This is a CE class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

Warranty

The original owner that the product delivered in this package will be free from defects in material and workmanship for one year parts after purchase.

There will be a minimal charge to replace consumable components, such as fuses, power transformers, and mechanical cooling devices. The warranty will not apply to any products which have been subjected to any misuse, neglect or accidental damage, or which contain defects which are in any way attributable to improper installation or to alteration or repairs made or performed by any person not under control of the original owner.

The above warranty is in lieu of any other warranty, whether express, implied, or statutory, including but not limited to any warranty of merchantability, fitness for a particular purpose or any warranty arising out of any proposal, specification or sample. We shall not be liable for incidental or consequential damages. We neither assume nor authorize any person to assume for it any other liability.

WARNING:

DO NOT TEAR OFF OR REMOVE THE WARRANTY STICKER AS SHOWN, OR THE WARRANTY IS VOID.